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Model **70803**

INSTALLATION AND OPERATING INSTRUCTIONS

Non-Programmable Electronic Thermostat Heat/Cool

Compatible with low voltage single stage gas, oil or electric heating or cooling systems and single stage heat pumps. For use on 24VAC systems (not to exceed 30VAC) and 250mv to 750mv millivolt heating only systems.

WARNING!

- To prevent electrical shock and/or equipment damage, disconnect electric power to system at main fuse or circuit breaker box until installation is complete.
- This thermostat requires 2 AA Alkaline batteries for power.
- Do not use this thermostat on applications with voltages above 30VAC.
- Wiring must conform to all local and national building/electrical codes and ordinances.
- Do not short (jumper) across terminals on the gas valve or at the system control to test the installation. This will damage the thermostat and void the warranty.
- This thermostat is equipped with automatic compressor protection to prevent damage due to short cycling. The short cycle protection provides a 5-minute delay between heating (heat pump models) or cooling cycles to prevent the compressor from being damaged.
- Do not switch the system to cool if the outdoor temperature is below 50 F (10 C). This may damage the cooling system and may cause personal injury.
- This thermostat should be used only as described in this manual.

SPECIFICATIONS

Electrical Rating:	24 Volt AC (18-30 VAC) 1 Amp Maximum per Terminal 3 Amps Total Load
Control:	1 Heat / 1Cool Non-Heat Pump
Set Point Range:	45 F – 90 F (7.0 C – 32.0 C)
Accuracy:	+/- 1 F (.5 C)
Terminations:	RC, RH, G, Y, W, B, O
Power:	3 VDC (2 AA Alkaline batteries)

Removing The Existing Thermostat

1) CAUTION: Make certain the power to the system has been disconnected.

2) Remove the cover of the old thermostat and locate the wires that are connected to the terminal board. IMPORTANT: Before removing these wires, NOTE (ON A PIECE OF PAPER) THE COLOR OF EACH WIRE AND THE CORRESPONDING TERMINAL MARKING ON THE OLD THERMOSTAT.

3) Remove the wires from the terminals. Remove the old thermostat and mounting base from the wall.

Installing The New Thermostat

1) CAUTION: Make certain the power to the system has been disconnected.

2) If this is a new installation, locate the thermostat 4 to 5 feet above the floor in accordance with applicable codes. Select a location that provides good airflow. Avoid locations in direct sunlight, near sources of heat, or near air vents. NOTE: The display is designed to be best viewed from a front downward angle.

3) Remove the back plate of the thermostat by gently depressing the bottom locking tab and swinging the back plate up and away.

4) Place the back plate against the wall in the desired mounting location with the thermostat wires protruding from the wall through the large rectangular whole in the back plate.

5) Mark placement of the (2) mounting holes (oval shaped holes in back plate) on the wall, remove the back plate, and drill (2) 3/16” holes.

6) Tap supplied plastic anchors into the holes.

7) Secure the back plate to the wall with the supplied screws making certain the thermostat wires have been inserted through the large rectangular hole in the back plate.

8) Carefully attach the thermostat wires to the appropriate connections on the terminal board on the back plate. Use the notes taken from step 2 of Removing The Existing Thermostat to determine their location on the new thermostat. Reference wiring diagrams are available in the back of this manual.

9) Carefully place the thermostat body face down on a soft surface to expose the main circuit board. Gently set the following switches in the correct position for the application.

- **GAS / ELECTRIC:** Configures the thermostat to either gas/oil or electric heating systems.
- **C / F:** Sets the display in either Celsius or Fahrenheit.
- **NORM / HP:** Configures the thermostat for normal heating/cooling systems or heat pump systems (single stage).

10) Attach the thermostat body to the back plate by resting the top of the thermostat body on the two clips on the upper portion of the back plate. Then gently press the front body into place until the bottom locking tab snaps into place. NOTE: The terminal board pins must be properly aligned with the sockets on the terminal board (on the back plate) in order for the front body to properly snap into place.

11) Set the system switch to the OFF position.

12) Set the fan switch to the AUTO position.

13) Open the front thermostat door and open the battery compartment door; install 2 AA Alkaline batteries (included).

14) Remove the clear plastic film from the display.

Testing The New Thermostat

WARNING!

- Do not switch the system to cool if the outdoor temperature is below 50 F (10 C). This may damage the cooling system and may cause personal injury.
- This thermostat is equipped with automatic compressor protection to prevent damage due to short cycling. The short cycle protection provides a 5-minute delay between heating (heat pump models) or cooling cycles to prevent the compressor from being damaged.

1) Restore the system power. The LCD (liquid crystal display) will display the room temperature. The LCD will illuminate at the touch of the red or blue arrow keys. LCD will return to its normal state after 10 seconds.

Image shows room temperature of 78.

2) Set the fan switch to the **ON** position. The system blower should start.

3) Set the fan switch to the **AUTO** position. The system blower should stop.

4) Set the system switch to the **HEAT** position and depress the red arrow key until the temperature set point is at least 3 degrees above the room temperature. The LCD will display a flame icon to indicate heat. The heating system should start within several seconds (the system blower may not come on immediately).

Image shows room temperature of 70 and HEAT set point of 73.

5) Set the system switch to the **OFF** position. The system should shut down within several seconds. The LCD will again display only the room temperature.

6) Set the system switch to the **COOL** position and depress the blue arrow key until the temperature set point is at least 3 degrees below the room temperature. The LCD will display a snowflake icon to indicate A/C. The cooling system should start within several seconds. WARNING: Do not perform this test if the outdoor temperature is below 50 F.

Image shows room temperature of 78 and A/C set point of 68.

7) Set the system switch to the OFF position. The system should shut down within several seconds. The LCD will again display only the room temperature.

Programming The User Settings

Temperature Differential is factory set at .5 F (0.25 C) for both heating and cooling cycles. The room temperature must change .5 F (0.25 C) from the set point temperature before the thermostat will initiate a call for heat or A/C. This should be appropriate for most applications. However, if the system is cycling on and off too frequently, the setting can be adjusted as follows.

1) With the system setting in the **OFF** position, simultaneously depress the red and blue arrow keys. The LCD (liquid crystal display) will display the temperature differential setting. Using the red and blue arrow keys set the differential to the desired setting of .5, 1, or 2 degrees. The higher the setting, the less frequently the system will cycle.

Image shows temperature differential setting of 0.5.

2) When the desired setting is made, release the key and the unit will automatically store the setting after 5 seconds.

Cooling Fan Time Delay is factory set at 60 seconds. When the thermostat is set in the COOL position, the system blower will continue to circulate air for a period of 60 seconds after the compressor(s) has shut off. This feature can be adjusted.

1) With the system setting in the **OFF** position, simultaneously depress the red and blue arrow keys. The LCD (liquid crystal display) will display the temperature differential setting. Release the keys and immediately press them again; the display will now show the fan delay time in seconds. Use the red and blue arrow keys to set the delay time to the desired setting of 0, 30, or 60 seconds.

Image shows fan delay setting at 60 seconds.

2) When the desired setting is made, release the key and the unit will automatically store the setting after 5 seconds.

Operating The New Thermostat

1) Set the System switch to either the HEAT or COOL position and the Fan switch to either the AUTO or ON position. NOTE: In AUTO, the system blower will run only when the A/C or heat is running. In ON, the system blower will operate continuously.

2) Use the red and blue arrow keys to select the desired temperature set point.

3) The LCD (liquid crystal display) displays the room temperature on the left and the set point temperature on the right. Note: The set point temperature may sometimes differ slightly from the room temperature due to a rapidly changing room temperature or a differential setting of 1 or 2.

Image shows room temperature of 78 and A/C set point of 68.

Understanding Additional Features

- **High Temperature Protection:** While in the **HEAT** position, if the room temperature reaches 93 F (34 C), the thermostat will automatically shut off. In the unlikely event the room temperature reaches 99 F (37 c), a mechanical bimetal switch will shut off the thermostat.
- **Low Temperature Protection:** While in the HEAT position, if the room temperature drops below 40 F (4 C), the thermostat will automatically initiate a call for heat.
- **Compressor Protection:** To protect the system compressor(s) from damage, the thermostat features a 5 minute delay. After the cooling system (or heat pump turns off), the thermostat will not allow it to re-start until the 5 minute delay expires. A blinking snowflake or flame (heat pump) indicates this feature has been activated. Once the 5 minute delay expires, the snowflake will illuminate continuously and the system will be able to re-start when called upon.

  NOTE: For the purpose of unit installation, this delay can be overridden by pressing the RESET button. This will erase any programmed settings.
- **System Reset:** The thermostat can be reset to factory software settings. All user entered settings will be lost. The reset will also override the 5 minute compressor protection feature. To reset the thermostat, gently press the reset button on the front panel using a paper clip or similar small pointed object.
- **Low Battery Detection:** Low battery power is displayed by the illumination of a battery icon in the LCD. The thermostat can operate for a period of 2 months once the warning has been initiated. Two fresh AA Alkaline batteries should be installed as soon as the warning icon illuminates.

Troubleshooting

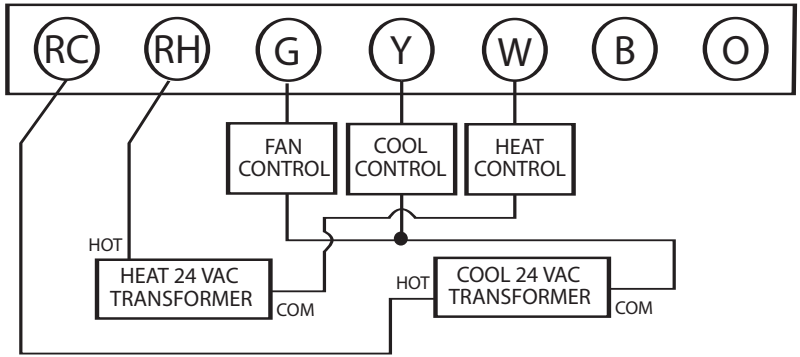
SYMPTOM	CORRECTIVE ACTION
Display is blank	Install 2 fresh AA Alkaline batteries
No heat	Set system switch to **HEAT** and raise set point above room temperature. Check thermostat wiring and connections. Check pilot light or HSI system on furnace.
No cool	Set SYSTEM switch to **COOL** and lower set point below room temperature. If snowflake is blinking, allow the 5 minute compressor lock-out to expire. Check thermostat wiring & connections.
Blinking snowflake/flame	Allow the 5 minute compressor lock-out to expire.
System turns on/off too frequently or not enough	Adjust the differential setting on the thermostat. A high differential decreases cycle rate and a low differential increases cycle rate.
Display is not illuminated	Touch the up or down arrow key. Display will illuminate for 10 seconds. Change the batteries (display will not illuminate when batteries are low)
Room temperature and set point disagree	Normal (depending on differential setting). Check for drafts that could quickly change the room temperature before the system is able to correct it.

(Troubleshooting cont.)

SYMPTOM		**CORRECTIVE ACTION**
System fan runs continuously		Set fan switch to **AUTO**. Check thermostat wiring & connections.
HI is displayed		Reduce room temperature or allow a newly installed thermostat to acclimate. HI indicates a room temperature reading greater than 90 F (32 C).
LO is displayed		Increase room temperature or allow a newly installed thermostat to acclimate. LO indicates a room temperature reading less than 45 F (7 C).

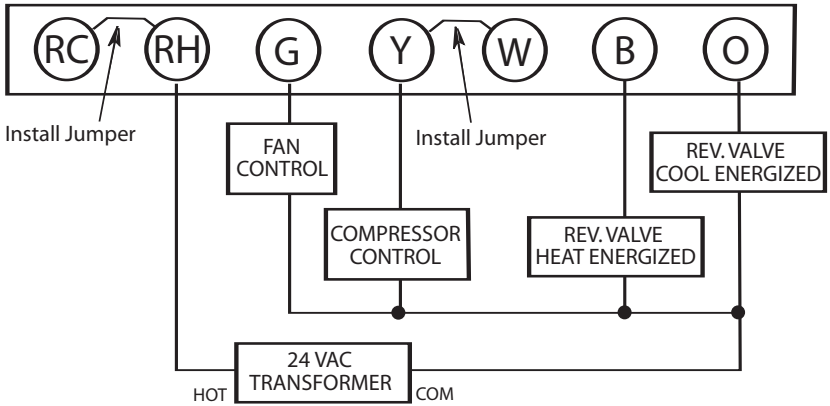
Wiring Diagrams

Typical 5-Wire System



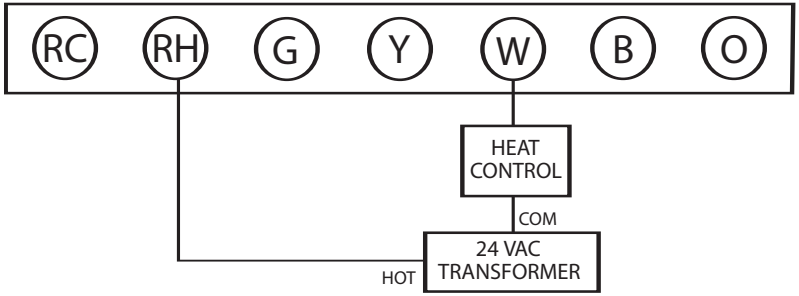
Wiring Diagrams

Typical Single Stage Heat Pump System



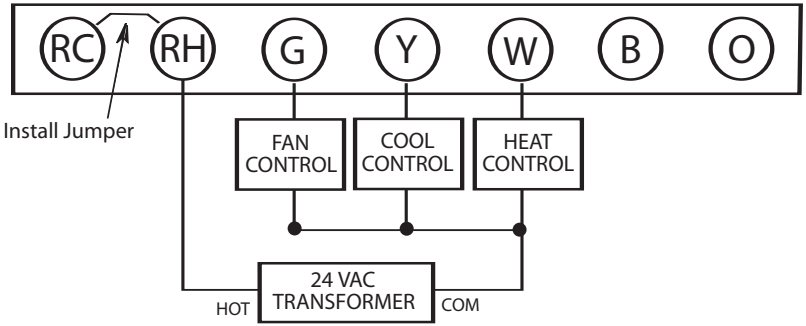
Wiring Diagrams

Typical 2-Wire Millivolt System



Wiring Diagrams

Typical 4-Wire System



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Warranty

ONE YEAR LIMITED WARRANTY

Motors & Armatures Inc. warrants each new MARS thermostat against any defects due to non-conforming material or workmanship for a period of one year after the original date of purchase by a professional service technician and does not include the cost of removal or re-installation. This warranty extends to the contractor or dealer who purchased the product from a wholesaler. For warranty claims, consumers should contact the contractor or dealer who installed the thermostat.

This warranty and Motors & Armatures' liability does not include damage to merchandise or thermostat resulting from accident, alteration, neglect, misuse, improper installation, or any other failure to follow Motors & Armatures' installation and operating instructions. Contact Motors & Armatures Inc. for full details on product warranty policy.

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